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Sperm Morphology of the Javan Muntjak, *Muntiacus muntjak muntjak*

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INTRODUCTION

Most cervids species showed a close correlation between antler periods i.e. velvet antler (VA) and hard antler (HA) periods and their reproductive activities [1] such as spermatogenesis and sperm quality. Data concerning spermatogenesis and sperm quality in the javan muntjak *(Muntiacus muntjak muntjak)* during both antler periods have reported previously [2]. However, the information about sperm morphology and morphometric is unavailable. Therefore in this study, we examined the morphology of sperm in this cervid and also it morphometric during VA and HA periods.

MATERIALS AND METHODS

Animal and ejaculates collection

An adult male javan muntjak was used in this study under permission from The Ministry of Forestry, Republic of Indonesia (SK. 23/Menhut-II/2011 for SW). Ejaculates were collected in both of VA and HA periods using an electro-ejaculator (Fujihira, FHK, Japan). Ejaculates immediately smeared on clean glass slides.

Morphology and morphometric examination

For sperms morphology observation, 10 slides were stained with Williams staining whereas scanning electron microscope (SEM) procedure was performed to observe the ultra structure of sperm. Additionally, a micrometer eyes piece utilized to measure 100 normal sperms at 400x magnification. Sperm morphology was analyzed descriptively whereas data of sperm morphometric were analyzed using a paired-sample t test.

RESULTS

Sperm morphology

Microscopically, sperm of the javan muntjak consist of the head in ovoid shape, neck, mid piece, principal piece, and end piece. According to the Williams staining, compartment among sperm head, mid piece, principal piece, and end piece was observed clearly. The sperm neck structure, how ever, more distinct in SEM feature that marked by the thick structure at the distal of sperm head (Fig.1).

Sperm morphometric

Sperm head length during HA period was significantly longer compared to the sperm head length during VA period ($p<0,05$). In addition, sperm total length during HA was also significantly longer compared to the sperm total length during VA. However, sperm tail length and head width between VA and HA periods were not significantly different ($p>0,05$) (Fig. 2).

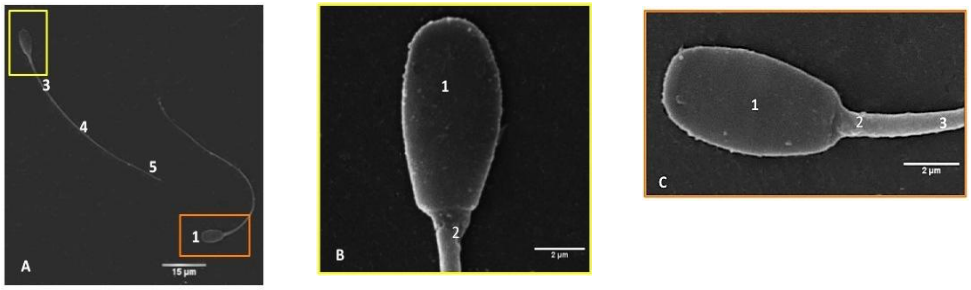

Figure 1. The ultra structure of sperm morphology of the javan muntjak. A: sperms consist of the head (1), mid piece (3), principal piece (4), and end piece (5). B, C: detail of sperm head (1), neck (2), and mid piece (3). SEM, bar scale 15 µm (A), 2 µm (B and C).

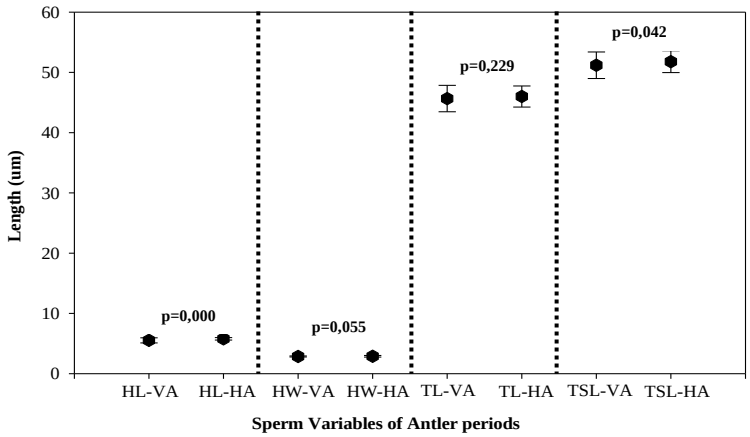

Figure 2. Length (mean ± std deviation) of sperm variables during velvet antler (VA) and hard antler (HA) periods in the javan muntjak. Head length, (HL), head width (HW), tail length (TL), total sperm length (TSL).

DISCUSSION AND CONCLUSION

Sperm morphology of the muntjak showed a similarity to the sperm in other cervids and also ruminants [3]. Difference total sperm length in muntjak during VA and HA periods also reported in red deer where in the mating season (HA), their sperm is longer than in pre and post mating season [3]. This phenomenon may cause by variation testosterone level in both antler periods [4]. Therefore, we concluded that sperm of muntjak showed a same characteristic of morphology in both antler periods but it different in morphometric.

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